

CLAIMS

1. An isolated nucleic acid molecule encoding a delta 12-fatty acid epoxxygenase enzyme comprising an amino acid sequence which is at least about 80% homologous to SEQ ID No. 2 or a homologue, an analogue or a derivative thereof which has epoxxygenase activity.
2. The isolated nucleic acid molecule of claim 1 wherein the amino acid sequence is at least 90% identical to SEQ ID NO.2 or a homologue, analogue or derivative thereof which has epoxxygenase activity.
3. The isolated nucleic acid molecule of claim 1 wherein the amino acid sequence is at least 95% identical to SEQ ID NO.2 or a homologue, analogue or derivative thereof which has epoxxygenase activity.
4. The isolated nucleic acid molecule of claim 1 wherein the amino acid sequence is at least 98% identical to SEQ ID NO.2 or a homologue, analogue or derivative thereof which has epoxxygenase activity.
5. The isolated nucleic acid molecule according to claim 1 having the nucleotide sequence of SEQ ID No.1 or its complement.
6. The isolated nucleic acid of claim 5 encoding a polypeptide having the sequence of SEQ ID No.2.
7. A chimeric gene comprising the isolated nucleic acid molecule of Claim 1 operably linked to at least one regulatory sequence that allows the expression of the coding sequence in a host cell.
8. The chimeric gene according to claim 7 wherein the at least one regulatory sequence allows expression of the coding sequence in a bacterial,

fungal, insect or plant cell.

9. The chimeric gene according to claim 7 wherein the at least one regulatory sequence allows expression of the coding sequence in a plant cell.

10. The chimeric construct according to Claim 7 wherein the at least one regulatory sequence is the phaseolin promoter.

11. A vector comprising the chimeric construct according to claim 7.

12. An isolated host cell comprising (a) an isolated nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is at least about 80% homologous to SEQ ID No. 2 or a homologue, an analogue or a derivative thereof which has epoxygenase activity, and at least one regulatory sequence that allows the expression of the coding sequence in a host cell, or (b) a vector comprising an isolated nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is at least about 80% homologous to SEQ ID No. 2 or a homologue, an analogue or a derivative thereof which has epoxygenase activity, and at least one regulatory sequence that allows the expression of the coding sequence in a host cell.

13. The host cell of claim 12 wherein the host cell is selected from the group consisting of yeast, bacteria, insect and plant cells.

14. A transgenic plant comprising (a) a chimeric gene comprising an isolated nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is at least about 80% homologous to SEQ ID No. 2 or a homologue, an analogue or a derivative thereof which has epoxygenase activity, and at least one regulatory sequence that allows the expression of the coding sequence in a host cell, or (b) a vector comprising an

isolated nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is at least about 80% homologous to SEQ ID No. 2 or a homologue, an analogue or a derivative thereof which has epoxygenase activity, and at least one regulatory sequence that allows the expression of the coding sequence in a host cell.

15. A method for producing delta -12 epoxy fatty acids which comprises:
(i) transforming a host cell with a chimeric construct comprising (a) a chimeric gene comprising an isolated nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is at least about 80% homologous to SEQ ID No. 2 or a homologue, an analogue or a derivative thereof which has epoxygenase activity, and at least one regulatory sequence that allows the expression of the coding sequence in a host cell, or (b) a vector comprising an isolated nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is at least about 80% homologous to SEQ ID No. 2 or a homologue, an analogue or a derivative thereof which has epoxygenase activity, and at least one regulatory sequence that allows the expression of the coding sequence in a host cell; and
(ii) growing the transformed host cells of step (i) under conditions that are suitable for expression of the nucleic acid molecule encoding the delta1-fattuy acid epoxygenase wherein the expression results in production of altered levels of fatty acid modifying enzyme in the transformed host cell.

16. The method of claim 15 in which the cell is a plant cell.

17. The method according to claim 15 comprising the additional step of (iii) regenerating the cell obtained by step (ii) into a plant

18. A method for producing a delta 12-epoxygenase enzyme comprising the following steps:

(i) transforming a microbial or a plant cell with a chimeric gene comprising an

isolated nucleic acid molecule encoding a delta 12-fatty acid epoxygenase enzyme comprising an amino acid sequence which is at least about 80% homologous to SEQ ID No. 2 or a homologue, an analogue or a derivative thereof which has epoxygenase activity, and at least one regulatory sequence that allows the expression of the coding sequence in a host cell;

(ii) growing the transformed cells obtained from step (i) under conditions that results in expression of the delta 12-epoxygenase enzyme.

19. The method of claim 18 wherein the isolated nucleic acid encodes a *Stokesia laevis* delta 12-epoxygenase enzyme.